Attorney's Docket: 2003DE430
Serial No.: 10/562,097
Filed: 12/21/2005
Response to Office Action Mailed 10/28/2008

REMARKS/ARGUMENTS

The Office Action mailed October 28, 2008 has been carefully considered together with each of the references cited therein. The amendments and remarks presented herein are believed to be fully responsive to the Office Action. Accordingly, reconsideration of the present Application in view of the following remarks is respectfully requested.

Applicant has amended the Specification to properly make record of the Abstract of the Disclosure which was previously filed in Applicant's Preliminary Amendment. The Abstract of the Disclosure is properly contained in a single paragraph. It believed that no new matter was added by this amendment.

The objection to the Specification for the abstract not being in a single paragraph form should be removed in light of Applicant's amendment.

Applicant has amended claim 1 to correct an obvious spelling error in the term 'alkoxylated' and to incorporate the elements of claim 2 without the term 'and mixtures thereof' and with the addition of the term 'the molecular weight determined by GPC using polyethylene as standard'. Support for the amendments to claim 1 may be found in originally filed claims 1 and 2, and in Applicant's Specification in Examples 10 – 12. In claim 9 the term 'and mixtures thereof' was removed and the misspelling of the term 'crosslinker' was corrected. Support for this amendment may be found in originally filed claim 9. Claims 3 – 6 and 8 were amended to attend to formalities and to change the dependencies to claim 1 and to be consistent with amended claim 1. Support for this amendment may be found in originally filed claims 1, 2, 3 – 6 and 8 and in Applicant's Specification. It is believed that no new matter was added by these amendments and no additional search is required on the part of the office.

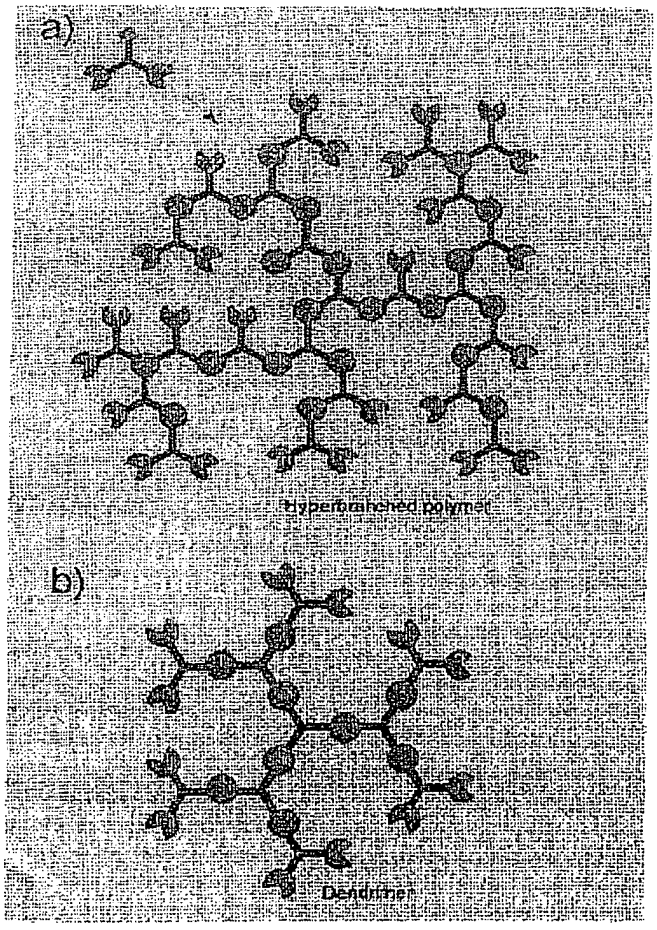
The objection to claims 1, 8 and 9 for informalities should be removed in light of Applicant's amendments.

The rejections of claims 3-4, 9, 1, and 5 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement should be removed in light of Applicant's amendments which removed reference to 'and mixtures thereof' and clarified the meaning of the term 'molecular weight'.

Applicant's invention relates to a method for demulsifying an oil/water emulsion. The method comprises adding an alkoxylated dendrimer to the oil/water emulsion in an amount from 0.0001 to 5% by weight, based on the oil content of the emulsion to be demulsified. The alkoxylated dendrimer is a dendritic polyester having a molecular weight of from 2400 to 100 000 g/mol, determined by GPC using polyethylene as standard. The dendritic polyester is alkoxylated with C_2-C_4-alkylene oxide groups or a mixture of C_2-C_4- alkylene oxide groups to provide the alkoxylated dendrimer with an average degree of alkoxylation of from 1 to 100 alkylene oxide units per free OH group, wherein the dendritic polyester has a starting alcohol and a dendritic growth component. The starting alcohol is selected from the group consisting of a mono-alcohol, di-alcohol, and polyfunctional alcohol, and the dendritic growth component is a carboxylic acid which has at least two hydroxyl groups.

In chemistry, there is a specific meaning in the art for the terms "*dendrimer*" and "*dendritic polyester*". This meaning is clearly shown in US Patent No. 5418301. US Patent No. 5418301 teaches structures of dendritic polyesters (See Abstract and Fig. 2). It is rather evident from Fig. 2 of the '301 Patent that a dendrimer is a symmetric polymer centered around the chain starting carboxylic acid. To further explain the structural differences between a dendrimer and a hyperbranched polymer, Applicant has attached an excerpt of an article by Scott M Grayson and Jean M. J. Frechet, published in Chemical Reviews, 2001, Vol. 101, pages 3819-3867. The Chemical Reviews article discloses on page 3820 that there are two basic types of polymers that consist entirely of branched repeat units: dendrimers and hyperbranched polymers. Hyperbranched polymers are usually the product of a noniterative polymerization procedure and therefore exhibit an irregular architecture (Figure 1a – see below) with incompletely reacted branch points throughout the

structure. Dendrimers, on the other hand, are highly ordered, regularly branched, globular macromolecules prepared by a stepwise iterative approach. The dendrimer structure (Figure 1b – see below) is divided into three distinct architectural regions: (i) a core or focal moiety, (ii) layers of branched repeat units emanating from this core, and (iii) end groups on the outer layer of repeat units. Dendrimers are thus differentiated from hyperbranched polymers by their structural perfection, leading to an exact number of concentric layers of branching points, or generations. See the difference in the structures in Fig. 1 a) and b) of the Chemical Review article reproduced hereinbelow:



Clearly, a **dendrimer** is not a **hyperbranched polymer**, but shows a certain symmetry which is not shown by the polymers of the US2005/0203193 Publication and US Patent No. 6310106. This dendrimer structure is lacking in the cited references: US2005/0203193 and US Patent No. 6310106. The compounds in both US2005/0203193 and US Patent No. 6310106 are not symmetric polymers centered around the chain starting carboxylic acid. In the '193 Publication, the polymers are based on fatty acids and the '193 Publication is silent on any acids having any OH groups. The '106 Patent discloses in column 2, lines 17-19, line 38, and line 55 that the carboxylic acids should be OH-free and is silent on a starting alcohol selected from the group consisting of a mono-alcohol, di-alcohol, and polyfunctional alcohol, and the dendritic growth component being a carboxylic acid which has at least two hydroxyl groups.

Claims 1, 3, and 5-7 were rejected under 35 U.S.C.102 (b) as being anticipated by Leinweber et al. (US2005/0203193 as an English equivalent of DE10224275) (hereinafter referred to as the '193 US Publication'). The rejection of claim 1, as amended, under 35 U.S.C.102 (b) as being anticipated by Leinweber et al. (US2005/0203193 as an English equivalent of DE10224275) should be withdrawn for the reason that the '193 Publication as discussed hereinabove the '193 Publication is silent on any acids having any OH groups any dendrimers formed with a starting alcohol selected from the group consisting of a mono-alcohol, di-alcohol, and polyfunctional alcohol, and the dendritic growth component being a carboxylic acid which has at least two hydroxyl groups, and thus does not disclose all of the elements of Applicant's invention. Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention. Therefore, the rejection of claim 1, as amended under 35 U.S.C.102 (b) as being anticipated by Leinweber et al. (US2005/0203193 as an English equivalent of DE10224275) should be withdrawn for the reason that the '193 Publication does not disclose all of the elements of Applicant's invention.

The rejection of claims 3 and 5-7, as amended under 35 U.S.C.102 (b) as being anticipated by Leinweber et al. (US2005/0203193 as an English equivalent of DE10224275) should be withdrawn for the reasons given in support of amended claim 1 from which claims 3 and 5-7 depend.

Claims 1, 3, and 6-7 were rejected under 35 U.S.C.102 (b) as being anticipated by Podubrin et al. (US 6310106) (hereinafter referred to as the '106 Patent). The rejection of claim 1, as amended, under 35 U.S.C.102 (b) as being anticipated by Podubrin et al. (US 6310106) should be withdrawn for the reason that the '106 Patent does not disclose all of the elements of Applicant's invention. As stated hereinabove, the compounds of the '106 Patent are not dendrimers, but hyperbranched polymers and the '106 Patent discloses in column 2, lines 17-19, line 38, and line 55 that the carboxylic acids should be OH-free, and the '106 Patent is silent on a dendrimer structure based on a starting alcohol selected from the group consisting of a mono-alcohol, di-alcohol, and polyfunctional alcohol, and the dendritic growth component being a carboxylic acid which has at least two hydroxyl groups. Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention. Therefore, the rejection of claim 1, as amended under 35 U.S.C.102 (b) as being anticipated by Podubrin et al. (US 6310106) should be withdrawn for the reason that the '106 Patent does not disclose all of the elements of Applicant's invention.

The rejection of claims 3 and 6-7 as amended under 35 U.S.C.102 (b) as being anticipated by Podubrin et al. (US 6310106) should be withdrawn for the reasons given in support of amended claim 1 from which claims 3 and 6-7 depend.

Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US 6310106), in view of Hult et al. (US Pat. No. 5418301). The rejection of Claim 4 as amended under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US 6310106), in view of Hult et al. (US Pat. No. 5418301) should be withdrawn for the reason that the examiner has failed to make a prima facie case of obviousness, and for the reason that the '106 Patent fails to disclose all of the

elements of Applicant's process, and for the reason that '106 Patent is silent on using the claimed carboxylic acids, and for the reason that no one skilled in the art would have been able to arrive at Applicant's invention without the selective combination of elements from '301 Patent which is directed to the non-analogous use of dendritic polyesters as an additive for curing of polymers and provides no teaching or suggestion of the utility of any of the dendritic macromolecules in demulsifying oils. As discussed hereinabove, the '106 Patent discloses hyperbranched polymers which are structurally different from Applicant's claimed alkoxylated dendrimers and structurally different from the compounds disclosed in the '301 Patent. There can be no simple combination of familiar elements or the substitution of the carboxylic acids of the '301 Patent into the '106 Patent without the recognition that a major structural change will result and there is no teaching in either the '106 Patent or in the '301 Patent that any dendrimer will function as an emulsion breaking additive in oil. Furthermore, claim 4 depends from amended claim 1 which was not rejected as being unpatentable over Podubrin et al. (US 6310106), in view of Hult et al. (US Pat. No. 5418301) and therefore should be allowable.
In KSR [MPEP2141(I.)] reaffirmed principles of the Law of Obviousness and pointed out that

(1) the combination of familiar elements according to known methods is likely to be obvious **when it does no more than yield predictable results**;

(2) when a patent claims a structure already known in the prior art that is altered by mere substitution of one element for another known in the field, the combination **must do more than yield a predictable result**;

(3) when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement the combination is obvious;

(4) when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, If a person of ordinary skill can implement a predictable variation, 103 bars patentability;

(5) **one must consider whether the improvement is more than the predictable use of prior art elements according to their established functions**.

As discussed hereinabove, the combinations of the prior art reference cited by the examiner failed to disclose Applicant's claimed process or elements of Applicant's claim for the reason that the proposed use of carboxylic acids disclosed in the '301 Patent will substantially alter the structure of the compounds disclosed in the '106 Patent and no one skilled in the art would have any expectation of success for the use of the dendrimer structure in breaking oil emulsions as claimed by Applicant. Thus, the rejection of Claim 4, as amended, under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US Patent No. 6310106), in view of Hult et al.(US Pat. No. 5418301) should be withdrawn for the reason that the examiner has failed to make a prima facie case of obviousness, and for the reason that the '106 Patent reference fails to disclose all of the elements of Applicant's process, and for the reason that '106 Patent is silent on using the claimed carboxylic acids, and for the reason that no one skilled in the art would have been able to arrive at Applicant's invention without the selective combination of elements from '106 Patent, and for the reason that the proposed substitution of the carboxylic acids of the '301 Patent into the '106 Patent will result in a completely different dendrimer structure than the disclosed structure of the '106 Patent and there is no teaching or suggestion that Applicant's claimed dendrimer structure will function as an emulsion breaker in crude oil emulsions.

The rejection of Claim 5, as amended under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US Patent No. 6310106), in view of Hult et al.(US Pat. No. 5418301) should be withdrawn for the reasons given hereinabove in support of claim 4. Claim 5 also depends from claim amended claim 1 which relates

to a method for breaking an emulsion in oil using Applicant's claimed alkoxylated dendrimer as recited in claim 1. Molecular weight of a different compound having a different structure such as the hyperbranched polymers of the '106 Patent has no meaning to anyone skilled in the art when applied to a molecule having a completely different structure as the dendrimer structure claimed by Applicant. In re Antonie, 559 F.2d 618. 195 USPQ 6 (CCPA 1977) does not apply to optimization of ranges in different compounds having different chemical structures.

The rejection of Claim 8, as amended under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US Patent No. 6310106) should be withdrawn for the reasons given hereinabove in support of amended claims 1, 4 and 5 which as clearly represents a different chemical structure (alkoxylated dendrimer) than disclosed in the '106 Patent (hyperbranched polymer) and no alteration of the ethylene and propylene oxides ratio will cause the compounds of the '106 Patent to result in Applicant's dendrimer structure as claimed in amended claim 8.

The rejection of Claim 9, as amended under 35 U.S.C. 103(a) as being unpatentable over Podubrin et al. (US Patent No. 6310106) should be withdrawn for the reasons given hereinabove in support of amended claims1, 4 and 5 which as clearly represents a different chemical structure (alkoxylated dendrimer) than disclosed in the '106 Patent (hyperbranched polymer) and for the reason that the proposed substitution of the carboxylic acids of the '301 Patent into the '106 Patent will result in a completely different dendrimer structure than the disclosed hyperbranched structure of the '106 Patent and there is no teaching or suggestion that Applicant's claimed dendrimer structure will function as an emulsion breaker in crude oil emulsions.

It is respectfully submitted that, in view of the above remarks, the objections to the specification and the claims, and the rejections under 35 U.S.C. §112, §102, and §103 should be withdrawn and that this application is in a condition for an allowance of all pending claims. Accordingly, favorable reconsideration and an allowance of all pending claims are courteously solicited. Commissioner is hereby authorized to charge any fee deficiency to Deposit Account No. 03-2060.

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An early and favorable action is courteously solicited.

Respectfully submitted,

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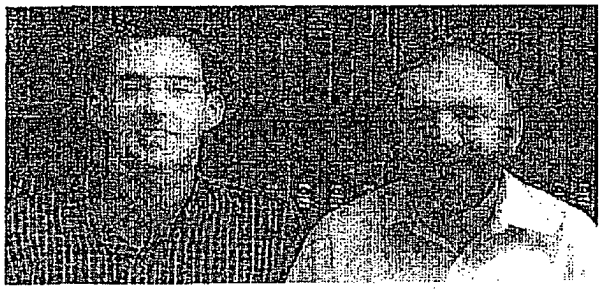
Attachment:

Scott M Grayson and Jean M. J. Frechet, published in Chemical Reviews, 2001, Vol. 101, pages 3820



Scott M. Grayson (left) was born in 1974 in St. Louis, Missouri. He studied at Tulane University in New Orleans and graduated summa cum laude with a BS in Chemistry in 1996. After completing his M.Phil. in Archaeological Chemistry at the University of Bradford (Bradford, U.K.), under the guidance of Prof. Carl Heron, he returned to the US to pursue doctoral studies in chemistry. He is presently researching the applications of dendritic architectures with Professor Jean M. J. Fréchet at the University of California, Berkeley.

Jean M. J. Fréchet (right) obtained his first degree at the Institut de Chimie et Physique Industrielles (now CPE) in Lyon, France, and Ph.D. degrees at SUNY–CESF and Syracuse University. Following academic appointments at the University of Ottawa (1973–1986) and Cornell University (1987–1996), he joined the department of chemistry at the University of California, Berkeley. Fréchet is a member of the National Academy of Science, the National Academy of Engineering, and the American Academy of Arts and Sciences. His research is concerned with functional polymers from their design and synthesis to their applications.

improvements on Vögtle's original synthesis were disclosed by Meijer and Mülhaupt that enabled the production of poly(propylene imine) (PPI) dendrimers.[7,8] In 1989–1990, Hawker and Fréchet introduced the convergent growth approach to dendrimers,[9,10] the second general route to dendritic structures, and the primary subject of this review. Since these seminal reports, thousands of papers have been written about the synthesis, properties, and applications of dendrimers, and a diverse range of complex macromolecules have been assembled, capitalizing on the unique architecture of dendritic molecules and the properties they confer.[11–28]

A. Structure

There are two basic types of polymers that consist entirely of branched repeat units: dendrimers and hyperbranched polymers. Hyperbranched polymers are usually the product of a noniterative polymerization procedure[29–31] and therefore exhibit an irregular architecture (Figure 1a) with incompletely reacted branch points throughout the structure.[17,32,33] Dendrimers, on the other hand, are highly ordered, regularly branched, globular macromolecules prepared by a stepwise iterative approach. Their structure is divided into three distinct architectural regions: (i) a core or focal moiety, (ii) layers of branched repeat units emanating from this core, and (iii) end groups on the outer layer of repeat units (Figure 1b). Dendrimers are differentiated from hyperbranched polymers by their structural perfection, leading to an exact number of concentric layers of branching points, or generations.

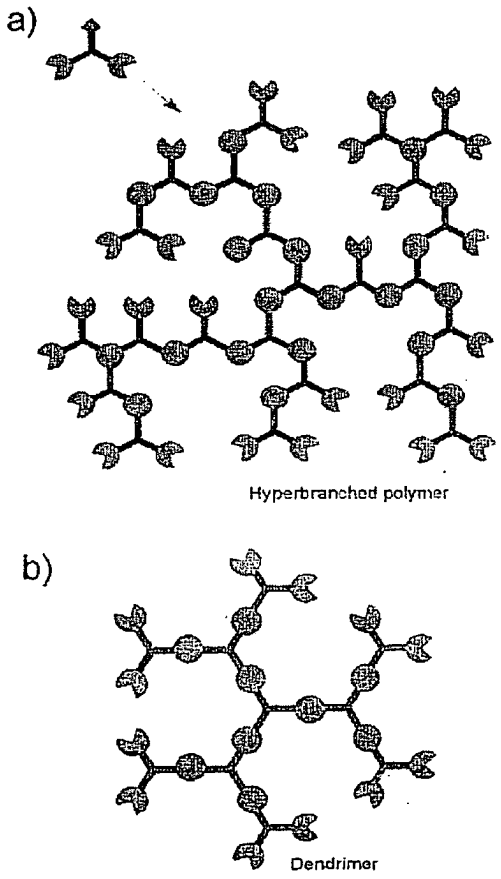


Figure 1.

At least three characteristic features of dendrimers are in sharp contrast to those of traditional linear polymers.

(i) A dendrimer can be isolated as an essentially monodisperse single compound, unlike most linear polymers whose synthesis affords a range of molecular species differing in molecular weight (MW). Size monodispersity results from a well-designed iterative synthesis that allows reactions to be driven to completion, side-reactions to be avoided, and in some cases, the dendritic products to be purified at intermediate steps during their growth.

(ii) As their molecular weight increases, the properties of dendrimers (e.g., solubility, chemical reactivity, glass transition temperature) are dominated by the nature of the end groups. Unlike linear polymers that contain only two end groups, the number of dendrimer end groups increases exponentially with generation, and therefore the end-groups frequently become the primary interface between the dendrimer and its environment.

(iii) In contrast to linear polymer growth that, theoretically, can continue ad infinitum barring solubility issues, dendritic growth is mathematically limited. During growth of a dendrimer, the number of monomer units increases exponentially with gen-